

AMENDMENTS TO THE CLAIMS

1. **(Currently amended)** A method for defining a Region Of Interest (ROI) of a carotid artery for subsequent processing, comprising:

providing at least one image including a portion of the carotid artery;

slicing the image into vertical slices;

5 selecting a stripe which corresponds to the Common Carotid Artery (CCA),
within each of the slices;

computing a size of each selected stripe;

comparing the sizes of the selected stripes;

identifying a base of a bulb of the carotid artery as corresponding to the stripe

10 having at least a minimum increase in size compared to stripes in lower slices; and
positioning the ROI below the base of the bulb.

~~specifying a physical characteristic of a morphological structure;~~

~~providing at least one image of a portion of the morphological structure, said image containing the physical characteristic; and~~

15 ~~automatically processing the image to identify the ROI in the image, wherein the ROI contains the physical characteristic, and wherein the ROI is smaller than the original image.~~

2. **(Currently amended)** The method of Claim 1 wherein selecting a stripe which corresponds to the CCA, within each of the slices, comprises selecting a stripe which corresponds to the CCA based on the order of the stripe within the slice. ~~specifying a physical characteristic of the morphological structure comprises specifying an Intima Media Thickness (IMT) of an artery.~~

3. **(Currently amended)** The method of Claim 1, wherein selecting the stripe which corresponds to the CCA, within each of the slices, comprises:

comparing the number of stripes within each of the slices to determine which slices have a valid number of stripes; and

selecting the stripe which corresponds to the CCA, within each of the slices having a valid number of stripes ~~2 wherein specifying the IMT comprises specifying the IMT of a carotid artery.~~

4. **(Currently amended)** The method of Claim 1 ~~3~~ wherein positioning an ROI with respect to the base of the bulb comprises positioning the ROI horizontally centered approximately 1.25 centimeters below the base of the bulb ~~specifying the IMT of the carotid artery comprises specifying the IMT of the carotid artery between approximately 1.0 cm and approximately 1.5 cm below the base of the bulb.~~

5. **(Currently amended)** The method of Claim 4, further including vertically centering the ROI approximately 0.05 centimeters above the highest point of a far wall of the carotid artery within a horizontal extent of the ROI ~~3 wherein specifying the IMT of the carotid artery comprises specifying the IMT the ROI comprises a region of the carotid artery between approximately 1.75 cm to approximately 2.25 cm below the bifurcation.~~

6. **(Currently amended)** The method of Claim 5, wherein positioning an ROI comprises positioning an ROI having an approximately 0.5 inch height and an approximately 0.5 inch width. ~~2 wherein determining the IMT of an artery comprises determining the IMT of a far wall of a carotid artery.~~

7. **(Currently amended)** The method of Claim 1 wherein computing a size of each selected stripe comprises computing a diameter of each selected stripe ~~providing at least one image comprises providing at least one digital image.~~

8. **(Currently amended)** The method of Claim 1 wherein comparing the sizes of the selected stripes comprises comparing averages of the sizes of the selected stripes of consecutive slices to averages of the sizes of the selected stripes of lower consecutive slices. ~~automatically processing the image comprises automatically comparing vertical slices of the image to find a bifurcation.~~

9. **(Currently amended)** The method of Claim 8 wherein selecting the slice including the stripe corresponding to at least a minimum increase in size compared to lower slices comprises selecting the slice including the stripe corresponding to at least an approximately ten percent increase in average size compared to lower slices. ~~automatically comparing the vertical slices comprises automatically comparing vertical slices approximately two pixels wide to find the bifurcation.~~

10. **(Cancelled)** The method of Claim 9 wherein automatically comparing vertical slices comprises automatically identifying stripes in the vertical slices, and comparing the stripes in substantially adjacent vertical slices to find the bifurcation.

11. **(Cancelled)** The method of Claim 10 wherein automatically identifying stripes comprises automatically identifying stripes by identifying a grouping of three bands consisting of:

- a first light band corresponding to a first vessel wall;
- a second dark band corresponding to a vessel lumen; and
- a third light band corresponding to a second vessel wall.

12. **(Cancelled)** The method of Claim 11 wherein automatically identifying stripes by identifying a grouping of three bands further comprises identifying bands with at least a fifty percent confidence.

13. **(Cancelled)** The method of Claim 1 wherein automatically processing the image comprises automatically comparing vertical slices of the image to find a bulb of the carotid artery.

14. **(Cancelled)** The method of Claim 13 wherein automatically comparing vertical slices of the image to find a bulb of the carotid artery comprises automatically comparing the lumen diameters of the slices.

15. **(Cancelled)** The method of Claim 14 wherein automatically comparing the lumen diameters of the slices comprises automatically determining where the Common Carotid Artery (CCA) lumen diameter grows approximately ten percent from one slice to the next slice.

16. **(Cancelled)** The method of Claim 1 wherein automatically processing the image comprises:

automatically defining a defined region approximately twenty percent higher and approximately twenty percent wider than the ROI from a previous image; and

5 automatically performing a pattern match within the defined region to determine a new ROI which matches a previous ROI.

17. **(Currently amended)** The method of Claim 1 further including, ~~if the automatically processing the image to identify the ROI in the image fails,~~ if the base of the bulb is not identified, providing a technician-generated ROI.

18. **(Cancelled)** The method of Claim 1 wherein the automatically processing the image to identify the ROI comprises automatically processing the image to identify the ROI, wherein the ROI is approximately 0.5 cm wide and approximately 0.5 cm deep.

19. **(Original)** A method for determining a Region Of Interest (ROI) for subsequent Intima Media Thickness (IMT) analysis, the method comprising:

providing at least one digital frame of a portion of a carotid artery, wherein the frame includes at least one of a set consisting of a bulb of the carotid artery and a bifurcation of the carotid artery;

automatically processing the frame to identify the ROI in the frame, the automatically processing comprising at least one of the set consisting of:

determining the ROI by detecting a bifurcation of the carotid artery, the determining comprising:

slicing the frame into vertical slices;

automatically comparing at least one of the vertical slices to at least one other of the vertical slices to find the bifurcation of the carotid artery;

determining the ROI horizontal extent to range from approximately 1.75 cm below the bifurcation to approximately 2.25 cm below the bifurcation;

identifying the highest point of a far wall segment of the carotid artery within the ROI horizontal extent; and

determining the ROI vertical extent to range from approximately 0.3 cm above the highest point to approximately 0.2 cm below the highest point; and

determining the ROI by detecting a bulb of the carotid artery, the determining comprising:

slicing the frame into vertical slices;

automatically comparing at least one of the vertical slices to at least one other of the vertical slices to find the bulb of the carotid artery;

determining the ROI horizontal extent to range from approximately 1.0 cm below the bulb to approximately 1.5 cm below the bulb;

identifying the highest point of a far wall segment of the carotid artery within the ROI horizontal extent; and

determining the ROI vertical extent to range from approximately 0.3 cm above the highest point to approximately 0.2 cm below the highest point; and

30 determining the ROI by pattern-matching a portion of the frame to a
previous ROI having a previous horizontal extent and a previous vertical extent; the
determining comprising:
 determining an expanded ROI horizontal extent to be the previous
horizontal extent expanded horizontally by a factor of approximately 1.2;
35 determining an expanded ROI vertical extent to be the previous
vertical extent expanded vertically by a factor of approximately 1.2;
 performing an automatic pattern match comparing the previous
ROI to the region defined by the expanded ROI horizontal extent and the expanded
ROI vertical extent; and
40 determining the ROI based on the highest correlation of the
automatic pattern match.

20. **(Cancelled)** A system for processing ultrasound images of the carotid artery,
comprising:

 an ultrasound sensor;
 an ultrasound apparatus adapted to generate frames;
5 a sensor cable connecting the ultrasound sensor to the ultrasound apparatus,
wherein the ultrasound apparatus is adapted to receive measurements from the
ultrasound sensor, and wherein
the ultrasound apparatus is further adapted to process the measurements to generate
ultrasound data;
10 a computer; and
 a path adapted to carry the ultrasound data from the ultrasound apparatus to the
computer, wherein the path is selected from a group consisting of dedicated cables,
phone lines, a Local Area Network (LAN), the Internet, and a wireless path,
 wherein the computer is adapted to pre-process the ultrasound data to generate
15 Regions Of Interest (ROIs) within the data for subsequent processing, wherein the
ROIs are subsets of the ultrasound data.

21. **(New)** A method for defining a Region Of Interest (ROI) of the carotid artery, comprising:

providing at least one image of a portion of the carotid artery;

slicing the image into vertical slices;

5 comparing at least one of the vertical slices to at least one other of the vertical slices to find a bifurcation of the carotid artery; and
positioning the ROI below the bifurcation.

22. **(New)** The method of Claim 21, wherein comparing at least one of the vertical slices to at least one other of the vertical slices to find the bifurcation of the carotid artery comprises:

identifying stripes within each slice, which stripes correspond to vessels; and

comparing the stripes in proximal slices to find the bifurcation.

23. **(New)** The method of Claim 22, wherein identifying stripes withing each slice comprises identifying three bands comprising:

a dark band corresponding to a vessel lumen; and

light bands above and below the dark band, wherein the light bands correspond to vessel walls.

24. **(New)** The method of Claim 23, wherein comparing at least one of the vertical slices to at least one other of the vertical slices includes comparing substantially adjacent vertical slices.

25. **(New)** The method of Claim 22 wherein comparing the stripes in proximal slices to find the bifurcation includes:

identifying if a first slice includes more stripes than the second slice, which first slice is above of the second slice;

identifying if a first top edge of a higher stripe in the first slice corresponds to a second top edge of a single stripe in the second slice;

identifying if a first bottom edge of a lower stripe in the first slice corresponds to a second bottom edge of the single stripe in the second slice.

26. **(New)** The method of Claim 21 wherein positioning the ROI with respect to the bifurcation comprises positioning the ROI horizontally centered approximately two centimeters below the bifurcation.

27. **(New)** The method of Claim 26 wherein positioning the ROI with respect to the bifurcation comprises positioning the ROI to range horizontally between approximately 1.75 cm below the bifurcation and approximately 2.25 cm below the bifurcation.

28. **(New)** The method of Claim 27 wherein positioning the ROI with respect to the bifurcation further comprises:

identifying a highest point of a far wall segment of the carotid artery within the ROI horizontal range; and

positioning the ROI vertically centered approximately 0.05 cm above the highest point.

29. **(New)** The method of Claim 28 wherein positioning the ROI with respect to the bifurcation further comprises positioning the ROI to range vertically from approximately 0.3 cm above the highest point to approximately 0.2 cm below the highest point.